

2. Turn the ignition switch on.

NOTE

The on position of the ignition switch is indicated by a vertical line (I).

3. Turn the fuel valve on.
4. Make sure the choke knob (**Figure 2**) is pushed down.
5. Open the throttle slightly and push the starter button or operate the recoil starter.

Engine is Flooded

If the engine is hard to start and there is a strong gasoline smell, the engine is probably flooded. If so, push the choke knob down (**Figure 2**). Open the throttle all the way and push the starter button or operate the recoil starter until the engine starts. If the engine is flooded badly, it may be necessary to remove the spark plug and dry its insulator, or install a new plug. When a flooded engine first starts to run, it will initially cough and run slowly as it burns the excess fuel. As the excess fuel is burned, the engine will accelerate quickly. Release the throttle at this

point. Because a flooded engine smokes badly when it first starts to run, start the engine outside and in a well-ventilated area with its muffler pointing away from all objects. Do not start a flooded engine in a garage or other closed area.

NOTE

*If the engine refuses to start, check the carburetor overflow hose attached to the fitting at the bottom of the float bowl (**Figure 4**). If fuel is running out of the hose, the float valve is stuck open or leaking, allowing the carburetor to overfill. If this problem exists, remove the carburetor and correct the problem as described in Chapter Eight.*

STARTING DIFFICULTY

If the engine cranks but is difficult to start, or will not start at all, do not drain the battery. Check for obvious problems first. Go down the following list step by step. Perform each step while remembering the three engine operating requirements described in this chapter.

If the engine still will not start, refer to the appropriate troubleshooting procedure that follows in this chapter.

1. Make sure the choke knob is in correct. See *Starting the Engine* in this chapter.
2. Make sure there is a sufficient quantity of gasoline in good condition in the fuel tank. If in doubt, drain the fuel and fill it with a fresh tank full. Check for a clogged fuel tank vent tube (**Figure 5**). Remove the tube from the filler cap, then wipe off one end and blow through it. Remove the filler cap and check for a plugged hose nozzle.

WARNING

Do not use an open flame to check in the tank. A serious explosion is certain to result.

3. Disconnect the fuel line (**Figure 6**) from the carburetor and insert the end of the hose into a clear container. Turn the fuel valve on and see if fuel flows freely. If fuel does not flow and there is a fuel filter installed in the fuel line, remove the filter and turn the fuel valve on again. If fuel flows, the filter is clogged and must be replaced. If no fuel comes out, the fuel valve may be shut off, blocked by

debris, or the fuel cap vent may be plugged. Reconnect the fuel line to the carburetor fitting.

4. If a flooded cylinder is suspected, or there is a strong smell of gasoline, open the throttle all the way and push the starter button or operate the recoil starter. If the cylinder is severely flooded (fouled or wet spark plug), remove the spark plug and dry the base and electrode thoroughly with a soft cloth. Reinstall the plug and attempt to start the engine. See *Starting the Engine* in this chapter.

5. Check the carburetor overflow hose on the bottom of the float bowl (**Figure 4**). If fuel is running from the hose, the float valve is stuck open or leaking. Turn the fuel valve off and tap the carburetor a few times. Then turn on the fuel valve. If fuel continues to run out of the hose, remove and repair the carburetor as described in Chapter Eight. Check the carburetor vent hoses to make sure they are clear. Check the end of the hoses for contamination.

NOTE

If fuel is reaching the carburetor, the fuel system could still be the problem. The jets (pilot and main) could be plugged or the air filter could be severely restricted. However, before removing the carburetor, continue with Step 6 to make sure the ignition provides an adequate spark.

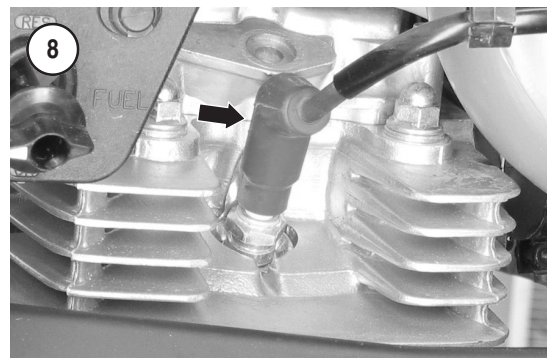
6. Make sure the engine stop switch (**Figure 7**) is operating correctly. If necessary, test the engine stop switch as described in Chapter Nine.

7. Make sure the spark plug high-tension wire and cap (**Figure 8**) is on tight. Push it on and slightly rotate it to clean the electrical connection between the spark plug and the wire connector. Hold the high-tension wire and screw the plug cap on tightly.

NOTE

If the engine still will not start, continue with the following.

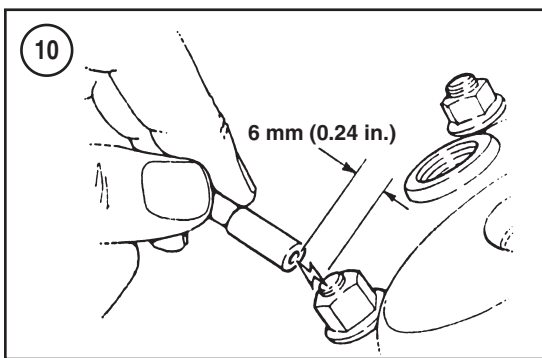
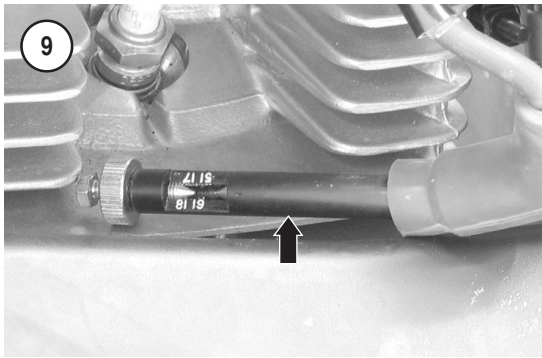
8. Perform a spark test as described in this section. If there is a strong spark, perform Step 9. If there is no spark or if the spark is very weak, test the ignition system as described in *Ignition System* in this chapter.
9. Check cylinder compression as follows:
 - a. Move the engine stop switch (**Figure 7**) to off.
 - b. Turn the fuel valve off.
 - c. Remove the spark plug and ground the spark plug shell against the cylinder head.



- d. Place your finger tightly over the spark plug hole.
- e. Operate the starter, or have an assistant operate the recoil starter. When the piston comes up on the compression stroke, pressure in the cylinder should force your finger from the spark plug hole. If so, the cylinder probably has sufficient compression to start the engine.

NOTE

A compression problem may exist even though it seems good with the previous test. Check engine compression using



a compression gauge as described in *Tune-Up* in Chapter Three.

Spark Test

Perform the following spark test to determine if the ignition system is producing adequate spark. When checking spark, turn the engine stop switch to run and the ignition switch to on.

CAUTION

Before removing the spark plug in Step 1, clean all debris away from the plug base. Dirt that falls into the cylinder will cause rapid engine wear.

1. Disconnect the plug wire and remove the spark plug.
2. Insert the spark plug (or spark tester) into the plug cap and touch its base against the cylinder head to ground it (**Figure 9**). Position the plug so the electrodes are visible. When using an adjustable spark tester, set its air gap to 6 mm (0.24 in.).

CAUTION

Mount the spark plug or spark tester away from the plug hole in the cylinder head so that the spark from the plug or tester cannot ignite the gasoline vapor in the cylinder.

3. Turn the engine over with the starter button or operate the recoil starter. A fat blue spark should be evident across the spark plug electrodes or spark tester terminals.

WARNING

Do not hold or touch the spark plug (or spark tester) wire or connector when making a spark check. A serious electrical shock may result.

4. If the spark is good, check for one or more of the following possible malfunctions:
 - a. Obstructed fuel line or fuel filter (if used).
 - b. Low compression or engine damage.
 - c. Flooded engine.
5. If the spark is weak (white or yellow in color) or if there is no spark, check for one or more of the following conditions:
 - a. Fouled or wet spark plug. If a spark jumps across a spark tester but not across the original spark plug, the plug is fouled. Repeat the spark test with a new spark plug.
 - b. Loose or damaged spark plug cap connection. Hold the spark plug wire and turn the spark plug cap to tighten it. Then install the spark plug into the cap and repeat the spark test. If there is still no spark, bypass the plug cap as described in the next step.
 - c. Check for a damaged spark plug cap. Hold the spark plug wire and unscrew the spark plug cap (**Figure 8**). Hold the end of the spark plug wire 6 mm (0.24 in.) from the cylinder head as shown in **Figure 10**. Have an assistant turn the engine over and repeat the spark test. If there is a strong spark, the spark plug cap is faulty. Replace the plug cap and repeat the spark test.
 - d. Loose or damaged spark plug wire connections (at the coil and plug cap).
 - e. Faulty ignition coil or faulty ignition coil ground wire connection.
 - f. Faulty ICM unit or stator coil(s).
 - g. On early 2000 FE and TE models, faulty sub-ICM unit.
 - h. Sheared flywheel key.
 - i. Loose flywheel nut.
 - j. Loose electrical connections.

- k. Dirty electrical connections.

NOTE

*If the engine backfires during starting, the ignition timing may be incorrect. Because the ignition timing is not adjustable, incorrect ignition timing may be caused by a loose flywheel, sheared flywheel key, loose ignition pulse generator mounting screws or connector, or a damaged or defective ignition system component. Refer to **Ignition System** in this chapter.*

Engine is Difficult to Start

The following section groups the three main engine operating systems with probable causes.

Electrical system

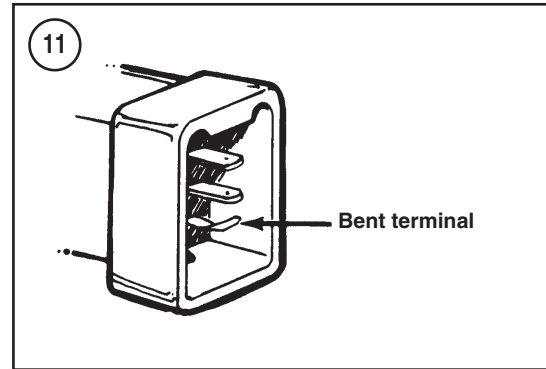
If an ignition problem occurs, it can usually be traced to a point in the wiring harness, at the connectors or in one of the switches.

1. Spark plug:
 - a. Fouled spark plug.
 - b. Incorrect spark plug gap.
 - c. Incorrect spark plug heat range (too cold). See Chapter Three.
 - d. Worn or damaged spark plug electrodes.
 - e. Damaged spark plug.
 - f. Damaged spark plug cap or spark plug wire.

NOTE

*Refer to **Spark Plug Reading** in Chapter Three for additional information.*

2. Ignition coil:
 - a. Loose or damaged ignition coil leads.
 - b. Cracked ignition coil body (look for carbon tracks on the ignition coil).
 - c. Loose or corroded ground wire.
3. Switches and wiring:
 - a. Dirty or loose fitting terminals.
 - b. Damaged wires or connectors (**Figure 11**).
 - c. Damaged ignition switch.
 - d. Damaged engine stop switch.
4. Electrical components:
 - a. Damaged ignition pulse generator.
 - b. Damaged ICM unit.



- c. On early 2000 FE and TE models, damaged sub-ICM unit.
- d. Sheared flywheel Woodruff key.

Fuel system

A contaminated fuel system will cause engine starting and performance related problems. It only takes a small amount of dirt in the fuel valve, fuel line or carburetor to cause a problem.

1. Air filter:
 - a. Plugged air filter element.
 - b. Plugged air filter housing.
 - c. Leaking or damaged air filter housing-to-carburetor air boot.
2. Fuel valve:
 - a. Plugged fuel hose.
 - b. Plugged fuel valve filter.
3. Fuel tank:
 - a. No fuel.
 - b. Plugged fuel filter.
 - c. Plugged fuel tank breather hose (**Figure 5**).
 - d. Contaminated fuel.
4. Carburetor:
 - a. Plugged or damaged choke system.
 - b. Plugged main jet.
 - c. Plugged pilot jet.
 - d. Loose pilot jet or main jet.
 - e. Plugged pilot jet air passage.
 - f. Incorrect float level.
 - g. Leaking or damaged float.
 - h. Worn or damaged needle valve.

Engine Compression

Check engine compression as described in Chapter Three. To obtain a more accurate gauge of en-

gine wear, perform an engine leak down test. Refer to *Cylinder Leak Down Test* in this chapter.

1. Cylinder and cylinder head:
 - a. Loose spark plug.
 - b. Missing spark plug gasket.
 - c. Leaking cylinder head gasket.
 - d. Leaking cylinder base gasket.
 - e. Worn or seized piston, piston rings and/or cylinder.
 - f. Loose cylinder and/or cylinder head fasteners.
 - g. Cylinder head incorrectly installed and/or torqued.
 - h. Warped cylinder head.
 - i. Valve(s) adjusted too tight.
 - j. Bent valve.
 - k. Worn valve and/or seat.
 - l. Worn or damaged valve guide(s).
 - m. Damaged compression release cam (mounted on camshaft).
 - n. Bent pushrod(s).
 - o. Damaged cam follower.
2. Piston and piston rings:
 - a. Worn piston rings.
 - b. Damaged piston rings.
 - c. Piston seizure or piston damage.
3. Crankcase and crankshaft:
 - a. Seized connecting rod.
 - b. Damaged crankcases.

POOR IDLE SPEED PERFORMANCE

If the engine starts, but off-idle performance is poor (engine hesitates or misfires), check the following:

1. Clogged or damaged air filter element.
2. Carburetor:
 - a. Plugged pilot jet.
 - b. Loose pilot jet.
 - c. Damaged choke system.
 - d. Incorrect throttle cable adjustment.
 - e. Incorrect pilot screw adjustment.
 - f. Flooded carburetor (visually check carburetor overflow hose for fuel).
 - g. Vacuum piston does not slide smoothly in carburetor bore.
 - h. Loose carburetor.
 - i. Damaged intake tube O-ring.
3. Fuel:
 - a. Water and/or alcohol in fuel.

- b. Old fuel.
4. Engine:
 - a. Low engine compression.
5. Electrical system:
 - a. Damaged spark plug.
 - b. Damaged ignition coil.
 - c. Damaged ignition pulse generator.
 - d. Damaged ICM unit.
 - e. On early 2000 FE and TE models, damaged sub-ICM unit.

POOR MEDIUM AND HIGH SPEED PERFORMANCE

Refer to *Engine is Difficult to Start*, then check the following:

1. Carburetor:
 - a. Incorrect fuel level.
 - b. Incorrect jet needle clip position.
 - c. Plugged or loose main jet.
 - d. Plugged fuel line.
 - e. Plugged fuel valve.
 - f. Plugged fuel tank vent tube.
2. Plugged air filter element.
3. Engine:
 - a. Incorrect valve timing.
 - b. Weak valve springs.
4. Other considerations:
 - a. Overheating.
 - b. Clutch slippage.
 - c. Brake drag.
 - d. Engine oil level too high.

ELECTRIC STARTING SYSTEM

This section describes troubleshooting procedures for the electric starting system. A fully charged battery, ohmmeter and jumper cables are required to perform many of these troubleshooting procedures.

Description

An electric starter (**Figure 12**) is used on all models. The starter is mounted horizontally at the rear of the engine.

The electric starting system requires a fully charged battery to provide the large amount of current required to operate the starter. A charge coil (mounted on the stator plate) and a voltage regula-

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